THURSDAY, MAY 27, 1915.

THE SCIENCE OF VULCANOLOGY.

The Problem of Volcanism. By Dr. J. P. Iddings. Pp. xvi + 273. (New Haven: Yale University Press; London: Oxford University Press, 1914.) Price 21*s*. net.

THIS work is the latest published of a series issued by the Yale University, acting as trustees for the Silliman Memorial Fund; the fund consists of the sum of 85,000 dollars left to provide for the delivery and publication of annual courses of lectures "to illustrate the presence and providence, the wisdom and goodness of God, as illustrated in the natural and moral world." Although the terms of the bequest strikingly recall those of the once-celebrated "Bridgewater Treatises," yet the testators of the Silliman Fund qualify the statement of terms by a declaration of a belief that "any orderly presentation of the facts of nature or history contributed to the ends of this foundation more effectively than any attempt to emphasise elements of doctrine or of creed." In the end they conclude that dogmatic and polemical theology should be excluded, and that "the subjects should be selected from the domains of natural science and history, giving special prominence to astronomy, chemistry, geology, and anatomy." A comparison of the terms of the Bridgewater and Silliman foundations give a by no means unsatisfactory impression of the improved relations between the representatives of natural science and theology which have arisen in the course of the last century.

With characteristic impartiality the authorities of Yale University have invited representatives of various branches of science to give clear and up-to-date presentments of the condition of our knowledge on the subjects selected by them. The successive courses of lectures have been given by Profs. J. J. Thomson, Sherrington, Rutherford, Bateson, and Sir W. Osler from this country; by Profs. Nernst and Max Verworn from Germany; and by Arrhenius from Sweden; only three of the published courses, indeed, are by American men of science.

For the science of vulcanology no better representative could possibly have been found than Dr. Iddings, and no more striking illustration of the progress of investigation and theory could be given than his discussion of the problem. Fifty years ago the question was thought to be virtually settled by the assumption of a molten central mass constituting the earth's interior, or at least of pockets of such heated material at moderate depths; granted this, it was believed that all the explosive and eruptive actions of volcanoes could be accounted for by the access of sea-water to these incandescent materials through fissures in the earth's solid "crust." Now, after a full discussion of the astronomical, physical, chemical, and geological evidence involved, the author shows that there are no valid grounds against the conclusion that the earth's interior is solid and cold, and that all thermal action may be attributed to radioactivity, whilst many problems of far greater complexity than were ever thought of in the past await solution.

Although every outstanding branch of the inquiry meets with full and sympathetic treatment at the hands of the author, yet it is on the characteristics and relations of volcanic rocks that he writes with special authority, and more particularly on the light which has been thrown on petrology by microscopic research, the branch of study with which Dr. Iddings has been so long identified. But whether dealing with such problems as those belonging to his own studies or such varied questions as are suggested by the characters of nebulæ, Dr. Iddings is equally at home; and nowhere, to our knowledge, can there be found an account, so complete and illuminating, of all the varied lines of research bearing on the subject under discussion. A word of praise must be added for the numerous and beautiful illustrations, while the printing of the work exhibits all those excellences which we are accustomed to find in scientific works issued in the United States.

J. W. J.

LIQUIDS UNMATHEMATICALLY TREATED.

(1) *The Dynamics of Surfaces: an Introduction to the Study of Biological Surface Phenomena.* By Prof. L. Michaelis; translated by W. H. Perkin. Pp. viii + 118. (London: E. and F. N. Spon, Ltd., 1914.) Price 4*s*. net.

(2) *Motion of Liquids.* By Lieut.-Col. R. De Villamil. Pp. xiv + 210. (London: E. and F. N. Spon, Ltd., 1914.) Price 7*s*. 6*d*. net.

(3) *Liquid Drops and Globules: Their Formation and Movements.* By C. R. Darling. Pp. x + 83. (London: E. and F. N. Spon, Ltd., 1914.) Price 2*s*. 6*d*. net.

(1) THE first part of the title of Dr. Michaelis's book is erroneous and misleading, for a mathematical physicist will fail to find anything whatever in these pages dealing with the dynamics of surfaces. It treats entirely of certain physico-chemical and electrical phenomena connected mainly with surfaces of separation of different media, and it makes no attempt at a rigorous theoretical investigation of these. As an illustra-

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tion of the style in which the subject matter is treated, about seventeen pages are devoted to a discussion of surface tension of a far more elementary character than is usually presented to an average B.Sc pass candidate working in the laboratories of a British university, and on the other hand the thermodynamical formulæ which follow are written down without any consistent attempt at lucid explanation. Had the book been described under the last portion of the title alone it is not improbable that it might have proved of use to biological students who are weak in their knowledge of physics and chemistry, but even they would do well to remember that a little learning is a dangerous thing, and the danger is greatly increased when this small cargo of information is allowed to sail disguised under the flag of a highly mathematical treatise.

(2) In the matter of sailing under misleading colours, Col. De Villamil is another delinquent. He recently published an "A.B.C. of Hydrodynamics" containing little or nothing on that subject which would be of use to a student pursuing a university course of study in hydrodynamics. By adopting a title closely resembling that of Lamb's classical treatise, he thrusts on our attention a small book devoted almost exclusively to common or garden *hydraulics*, and dealing far less with the actual motions of the fluids than with the resistances which they exert on solids. Many of his statements are not very clearly expressed; for instance, what does he mean by saying that "in an incompressible liquid which *has no free surface and whose envelope is inextensible all bodies moving in steady motion in it are stream-line*"? (p. 199), or, again, that "if any flat body *of any shape* be caused to move *irrotationally* round a fixed point, *every point in the body* will describe a figure which is an *inverted reflexion* of the body moving"? (p. 205).

Had Col. De Villamil claimed to write about "Practical Hydraulics," it is probable that a good deal of the subject matter of the book would have been of use to engineers. In posing as a mathematical physicist the author is probably defeating his own ends.

(3) Mr. Charles Darling's lectures on "Liquid Drops and Globules" present to an unscientific reader a simple and lucid exposition of a number of pretty experiments on liquids, many of which can be repeated by the most uninitiated at a trifling expense. The apparatus required is mostly of the simplest possible character, though for lecture purposes a lantern attachment is necessary. We note the author's recommendation of tap-water as superior to "distilled water, which often possesses a surface so greasy as to retard or even entirely prevent the desired result." Curiously enough, the present reviewer's experiences in spreading diatoms on cover glasses have confirmed this difficulty of greasiness, and for mounting in resinous media the best results were frequently obtained by evaporating from a thick convex drop of ordinary filtered water heated to a high temperature, the impurities in the water being deposited round the edge of the cover, where they could be wiped off. The greasiness so often present in distilled water frequently caused the drop to tear away from the edges of the cover long before it had became reduced to a mere film, and often left actually more deposit on the diatoms than the less pure liquid. The same occurred when the drop was initially too thin.

Readers who are unable to specialise in science, but who wish to interest themselves in some of its developments, can do no better than study a book of this kind. The experiments described form a delightful recreation for those engaged in duties of a non-scientific character, and at the same time they are directed on such lines as are likely to give them the closest insight into the intricacies and difficulties of scientific investigation. G. H. B.

INSECTS AND MAN.

(1) *Flies in Relation to Disease—Bloodsucking Flies.* By Dr. E. Hindle. Pp. xv+398. (Cambridge: At the University Press, 1914.) Price 12*s*. 6*d*. net.

(2) *Insects and Man.* By C. A. Ealand. Pp. 343. (London: Grant Richards, Ltd., 1915.) Price 12*s*. net.

(1) THIS book is an attempt to combine in one volume the entomological information required by the doctor and the medical facts required by the entomologist, with regard to bloodsucking flies and the diseases they carry. The literature on this subject, being a special one, is very large, and is being added to daily. The whole subject is one that dates back only twenty years, and to attempt to present in a small compass a summary of these two aspects is no easy task. To do it successfully requires exceptional judgment in selecting what to omit and what to include, as well as a first-hand knowledge of both aspects of the subject. There is no evidence that the author has the latter, and the volume bears the impress of the laboratory, not of the tropics where these insects live and where men die daily from the diseases they carry. No one with actual tropical experience would omit from an account of measures taken against mosquitoes the use of traps and fumigants; no one with a first-hand

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